-continued

$$= L_O(\varpi_i) f_s(\varpi_i \to \omega_o) \frac{\delta A_D}{\frac{(x_D - x_O)^2}{M^2} + \frac{(y_D - y_O)^2}{M^2} + Z_{OD}^2}$$

$$f_s = \frac{d L_O(\varpi_o)}{L_i(\omega_i) d\Omega(\varpi_i)}$$

is the bidirectional transmittance function for the diffuser element where

$$\omega_i = \|R^*_{OD}\|$$

$$\omega_o = \|R^*_{DL}\| \tag{7}$$

[0103] Now the illuminance at the lens is

$$E_L = L(\theta_H, \theta_V)\delta\Omega_{DL}$$

$$= L_O(\theta_H, \theta_V) \frac{A_{lens}}{|R^*_{DL}|^2}$$

$$= L_O(\theta_H, \theta_V) \frac{A_{kens}}{4\pi\left[\frac{x_D^2}{M^2} + \frac{y_D^2}{M^2} + Z_{DL}^2\right]} \tag{8}$$

And the flux through the lens is

$$\Phi_{lens} = E_L A_{lens} \tag{9}$$

$$= L_O(\theta_H, \theta_V) \frac{A_{kens}^2}{4\pi\left[\frac{x_D^2}{M^2} + \frac{y_D^2}{M^2} + Z_{DL}^2\right]}$$

[0104] To find the illuminance imaged at each grid area on the retina by the lens, which is the stimulus at that area, take the flux through the lens and divide it by the area of the corresponding grid element

$$E_v\Big|_{\substack{x_R\\y_R}} \cong \frac{\Phi_{Lens}}{\delta A_R}$$

So

$$E_v\Bigg|_{\substack{x_R\\y_R}} = \frac{f_s(\varpi_i \to \varpi_o) L_O(\theta_H, \theta_V) A_{Lens}^2}{\left(\frac{(x_D - x_O)^2}{M^2} + \frac{(y_D - y_O)^2}{M^2} + Z_{OD}^2\right)\left(\frac{x_R^2}{M^2} + \frac{y_R^2}{M^2} + Z_{DL}^2\right)} \frac{\delta A_O}{\delta A_R} \tag{10}$$

[0105] However the result is required to be independent of the grid and so dissolve the ratio on the right hand side. The

$$\lim_{\delta A_R \to 0} \frac{\delta A_D}{\delta A_R} = \frac{\partial A_O}{\partial A_R} \tag{11}$$

for $\delta A_F = f(\delta A_O)$ and since

$$\delta A_R = \delta x_R \delta y_R = M\delta x_O M\delta y_O \tag{12}$$

$$= M^2 \delta x_O \delta y_O = M^2 \delta A_O$$

$$\frac{\partial A_F}{\partial A_O} = M^2 \tag{13}$$

and finally

$$PSF(x_D, y_D, Z_{OD}, Z_{LD}) = \frac{f_s(\varpi_i \to \varpi_o) L_O(\theta_H, \theta_V) A_{pupil}^2}{\left(\frac{(x_D - x_O)^2}{M^2} + \frac{(y_D - x_O)^2}{M^2} + Z_{OD}^2\right)\left(\frac{x_R^2}{M^2} + \frac{y_R^2}{M^2} + Z_{DL}^2\right)} M^2 \tag{14}$$

where

$$\theta_H = \tan^{-1}\left(\frac{x_R}{MZ_{OD}}\right)$$

$$\theta_V = \tan^{-1}\left(\frac{y_R}{MZ_{OD}}\right)$$

[0106] An intuitive way to think about moiré is shown in **FIG. 2** which shows two gratings of slightly different wavelengths (**7**) overlaid. When each of these screens is imaged by the lens on the same plane there is interference (**8**) between two square waveforms of slightly different frequency—which, considering how the average density varies across the screen, produces a beating pattern.

[0107] The following describes, in a rigorous way, how this beating phenomenon occurs in multi-layered imaging systems. The situation presented in **FIG. 2***a* is similar for LCD panels that are spaced apart and have regularly sized and spaced apertures containing red, green and blue filters.

[0108] Each filter of, each layer, is modelled separately with the spectral transmission function. This is overlaid upon a scaled 2D square wave with Lambertian luminance of BL_O or zero for the rear imaging layer; and a transmittance of one or zero for the front imaging plane. The origin of this wave is at the optical axis shown as the vertical centre line on **FIG. 2***c*. The black matrix (**9**) is included implicitly in this setup. The luminance/transmission functions are expressed mathematically in Equations 15 and 16 where the symbols are defined in **FIG. 3**. The multiplication is